

## DEODORIZING SYSTEM

### CROSS REFERENCE TO RELATED PATENT APPLICATION

**[0001]** This patent application is based on a U.S. provisional patent application No. 60/549,892 filed March 1, 2004.

### FIELD OF THE INVENTION

**[0002]** The present invention relates to a deodorizing system, and more particularly to a deodorizing system for ventilating bad odor generated from the odor generating sources in a bathroom.

### BACKGROUND OF THE INVENTION

**[0003]** The poor air quality of toilets has already been taken for granted, especially for frequently used public toilets. In order to dilute the toilet odor, many ventilation mechanisms were developed. Referring to Fig. 1, a ventilated toilet with an air duct is disclosed in, for example, Taiwanese Patent Publication No. 00205832, entitled "Toilet Exhaust Device", and the contents of which are hereby incorporated for reference. As shown in Fig. 1, the ventilated toilet 1 includes an air duct 10 around the bowl rim thereof for exhausting the toilet odor therethrough.

**[0004]** Referring to Fig. 2, a schematic layout view of a conventional deodorizing system disclosed in Japanese Patent Application No. JP 03-199538 is illustrated. As shown in Fig. 2, the deodorizing system includes several ducts 31, 35, 29 and 33 for exhausting the bad odor generated from several odor generating sources such as a toilet bowl 9 for urine, a deodorizing port 27, a toilet bowl 17

and a washing stand unit 21, respectively. The ducts 31, 29, 33 and 35 are connected to a ventilation duct 37. The negative pressure of the deodorizing system is established by a ventilating fan 39, which is installed in the downstream of the ventilation duct 37. As known, the ventilation volume per unit time is dependent on the length, type or diameter of the duct and the distance between respective odor generating source and the ventilating fan 39. For controlling the ventilation volume per unit time of each odor generating source, adjusting valves 41, 47, 43 and 45 are installed between the ducts 31, 35, 29 and 33 and the odor generating sources 9, 27, 17 and 21, respectively. By using the adjusting valves to control the ventilation volume per unit time within an acceptable value, each odor generating source has sufficient suction and deodorizing capacity. In addition, the bad odor generated from one source will not be exhausted from any other odor generating source. As shown in Fig. 2, the odor generating sources 9, 27 are relatively farther than the odor generating sources 17 and 21 from the ventilating fan 39. Consequently, the openings of the adjusting valves 41 and 47 should be larger than those of the adjusting valves 43 and 45.

**[0005]** Referring to Fig. 3, a schematic layout view of another conventional deodorizing system used in a house having two bathrooms is illustrated. One bathroom includes several odor generating sources such as a toilet bowl 8 for urine, a deodorizing port 26, a toilet bowl 16 and a washing stand unit 20. The ducts connected with these odor generating sources 8, 26, 16 and 20 are connected to a ventilation duct 5. The odor generating sources of the other bathroom includes a toilet bowl 9 for urine, a deodorizing port 27, a toilet bowl 17 and a washing stand

unit 21. The ducts connected with these odor generating sources 9, 27, 17 and 21 are connected to another ventilation duct. The negative pressure of the deodorizing system is established by a ventilating fan 39, which is installed in the downstream of the ventilation ducts. Likewise, adjusting valves 40, 46, 42, 44, 41, 47, 43 and 45 are installed to the proximate odor generating sources 8, 26, 16, 20, 9, 27, 17 and 21, respectively, in order to control the ventilation amount of the bad odor.

**[0006]** Unfortunately, it is difficult to adjust the flow rate or the static pressure of the odor in each conduit. For example, the low pressure conduit can withstand a pressure range of from -500 Pa to +500 Pa, the medium pressure conduit can withstand a pressure range of from -1000 Pa to +750 Pa, and the high pressure conduit can withstand a pressure range of from -750 Pa to +2000 Pa. Since the toilet bowl 8 and the deodorizing port 26 is very distant from the ventilating fan 39 and the length of the duct 5 is very long, the static pressures thereof are possibly lower than the operative ranges of the corresponding adjusting valves 40 and 46. In contrast, since the washing stand unit 21 is very close to the ventilating fan 39, the static pressure thereof readily exceeds the operative range of the adjusting valve 45. Therefore, some of the adjusting valves are ineffective for controlling ventilation amount. Due to the above problems, the expansibility of the layout configuration is limited.

## SUMMARY OF THE INVENTION

**[0007]** The present invention is to provide a deodorizing system for ventilating bad odor generated from the odor generating sources in a

bathroom, in which the flow rate or the static pressure of the odor in each conduit are controllable.

**[0008]** In accordance with an aspect of the present invention, there is provided a deodorizing system. The deodorizing system includes a first main conduit, a suction generating device, a first terminal conduit, a first odor generating source, a second terminal conduit, a second odor generating source and a first adjusting damper. The suction generating device is disposed in the downstream of the first main conduit. The first terminal conduit is connected to the first main conduit by a first junction. The first odor generating source is connected to the first terminal conduit. The second terminal conduit is connected to the first main conduit by a second junction. The second odor generating source is connected to the second terminal conduit. The first adjusting damper is positioned in the first main conduit between the first junction and the second junction for regulating the airflow ratio of the first odor generating source to the second odor generating source.

**[0009]** In an embodiment, the deodorizing system further comprises a second adjusting damper and a third adjusting damper. The second adjusting damper is positioned in the first terminal conduit proximate to the first odor generating source. The third adjusting damper is positioned in the second terminal conduit proximate to the second odor generating source.

**[0010]** In an embodiment, the first, second and third adjusting dampers are adjusting valves having adjusting varied opening area for regulating the ventilation amounts in the first main conduit, the first terminal conduit and the second terminal conduit.

[0011] In an embodiment, the adjusting valves are ball valves, gate valves or butterfly valves.

[0012] In an embodiment, the suction generating device is a ventilating fan or a pump, and a check valve is disposed in the downstream of the suction generating device for preventing backflow.

[0013] In an embodiment, the deodorizing system further comprises a second main conduit connected to the first main conduit by a third junction proximate to the suction generating device, a third terminal conduit connected to the second main conduit by a fourth junction, and a third odor generating source connected to the third terminal conduit.

[0014] In an embodiment, the deodorizing system further comprises a fourth adjusting damper positioned in the second main conduit for regulating the ventilation amounts in the second main conduit.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The above contents of the present invention will become more readily apparent to those ordinarily skilled in the art after reviewing the following detailed description and accompanying drawings, in which:

[0016] Fig. 1 is a schematic view illustrating a ventilated toilet with an air duct;

[0017] Fig. 2 is a schematic layout view of a conventional deodorizing system;

[0018] Fig. 3 is a schematic layout view of another conventional deodorizing system used in a house having two bathrooms;

[0019] Fig. 4 is a schematic layout view of a deodorizing system according to a preferred embodiment of the present invention;

[0020] Fig. 5 is a schematic layout view of a deodorizing system according to another preferred embodiment of the present invention;

[0021] Fig. 6 schematically illustrates a removable perforated plate having varied opening area to be served as the adjusting damper; and

[0022] Figs. 7(a) and 7(b) are simplified layout configurations of the conventional deodorizing system; and

[0023] Figs. 7(c) and 7(d) are simplified layout configurations of the deodorizing system according to the present invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0024] The present invention will now be described more specifically with reference to the following embodiments. It is to be noted that the following descriptions of preferred embodiments of this invention are presented herein for purpose of illustration and description only; it is not intended to be exhaustive or to be limited to the precise form disclosed.

[0025] Referring to Fig. 4, a schematic layout view of a deodorizing system according to a preferred embodiment of the present invention is illustrated. In this embodiment, the deodorizing system is utilized to exhaust the odor generated from two odor generating sources, e.g. a first toilet urinal 91 and a second toilet urinal 92. The deodorizing system principally includes a main conduit 93, a first terminal conduit

910, a second terminal conduit 920 and a suction generating device 90. The first terminal conduit 910 is connected to the main conduit 93 by a first junction 931, and the second terminal conduit 920 is connected to the main conduit 93 by a second junction 932. The suction generating device 90 is disposed in the downstream of the main conduit 93. In accordance with a feature of the present invention, a first adjusting damper 94 is positioned in the main conduit 93 between the first junction 931 and the second junction 932. The first adjusting damper 94 is effective for regulating the airflow ratio of the first odor generating source 91 to the second odor generating source 92 and the static pressure difference between the first terminal conduit 910 and the second terminal conduit 920. Therefore, the problems resulting from the very long conduit will be overcome. Moreover, a second adjusting damper 95 is positioned in the first terminal conduit 910 proximate to the first odor generating source 91, and a third adjusting damper 96 is positioned in the second terminal conduit 920 proximate to the second odor generating source 92. By the second adjusting damper 95 and the third adjusting damper 96, the ventilation amount of exhausting the bad odor generated from the first odor generating source 91 and the second odor generating source 92 are regulated for pressure-balancing purposes of the whole deodorizing system.

**[0026]** A further embodiment of a deodorizing system is illustrated in Fig. 5. The deodorizing system of Fig. 5 is used in for example two bathrooms. One bathroom includes several odor generating sources such as a toilet bowl 8 for urine, a deodorizing port 26, a toilet bowl 16 and a washing stand unit 20. The ducts connected with these odor generating

sources 8, 26, 16 and 20 are connected to a second main duct 102. The odor generating sources of the other bathroom includes a toilet bowl 9 for urine, a deodorizing port 27, a toilet bowl 17 and a washing stand unit 21. The ducts connected with these odor generating sources 9, 27, 17 and 21 are connected to a first main duct 101. A suction generating device 39 is disposed in the downstream of the main conduits 101 and 102. Three adjusting dampers 990, 994 and 995 are positioned in the first main conduit 101 between any two adjacent junctions. Likewise, three adjusting dampers 991, 992 and 993 are positioned in the second main conduit 102 between any two adjacent junctions. By the adjusting dampers 990, 991, 992, 993, 994 and 995, the ventilation amount of exhausting the bad odor generated from the odor generating sources are regulated for pressure-balancing purposes of the whole deodorizing system. Therefore, the problems of causing a large static pressure difference between the far and near odor generating sources due to the very long conduit will be overcome. Likewise, adjusting valves 40, 46, 42, 44, 41, 47, 43 and 45 are installed to the proximate odor generating sources 8, 26, 16, 20, 9, 27, 17 and 21, respectively, in order to control the ventilation amount of the bad odor. For preventing backflow when the suction generating device 39 is shut down, a check valve 100 is disposed in the downstream of the suction generating device 39.

**[0027]** In the above embodiments, the suction generating device is a ventilating fan or a pump. The junctions are tee junctions. The adjusting dampers are removable perforated plate having varied opening area as shown in Fig. 6. Alternatively, the adjusting dampers can be



implemented by other regular adjusting valves such as ball valves, gate valves or butterfly valves.

**[0028]** The layout configuration of the conventional deodorizing system can be simplified as Figs. 7(a) and 7(b). The numeral reference designated by 7, 70, 71 and 72 indicate the suction generating device, the junctions, the odor generating sources and the adjusting valves (or dampers), respectively. Whereas, the layout configuration of the deodorizing system of the present invention can be simplified as Figs. 7(c) and 7(d). As shown in Figs. 7(c) and 7(d), the adjusting dampers are positioned in the main conduit between any two adjacent junctions and in the terminal conduits proximate to the odor generating sources. Depending on the distance between the respective odor generating source and the suction generating device, the ventilation volume in each conduit is adjusted within an acceptable value in order to achieve pressure-balancing purposes of the whole deodorizing system. Since the flow rate and the static pressure of the odor in each conduit are controllable by using the adjusting dampers, the expansibility of the layout configuration is possible.

**[0029]** While the invention has been described in terms of what is presently considered to be the most practical and preferred embodiments, it is to be understood that the invention needs not to be limited to the disclosed embodiment. On the contrary, it is intended to cover various modifications and similar arrangements included within the spirit and scope of the appended claims which are to be accorded with the broadest interpretation so as to encompass all such modifications and similar structures.